



# S7 DPU Products

## High Performance Programmable DPU 1/10/25/40/50/100/200GbE Controller

Enables several offloads, programmable compute, encryption, virtualization over a single wire.

### Overview

Chelsio's S7 is a quad port 1/10/25/50/100Gb or dual port 40/100/200Gb Ethernet Unified Wire DPU ASIC with a PCI Express 5.0 host bus interface, optimized for storage, cloud computing, HPC, virtualization, security, AI, and other datacenter networking applications.



The seventh generation S7 ASIC technology from Chelsio provides the highest performance and efficiency, with dramatically lower host system CPU communications overhead. Thanks to on-board hardware, that offloads TCP/IP, UDP/IP, Unified RDMA (RoCEv2 & iWARP), iSCSI, NVMe-oF, NVMe/TCP, NVGRE, VXLAN, and TLS/IPsec processing from its host system and frees up host CPU cycles for the user applications. As a result, the system benefits from higher bandwidth, lower latency, and reduced power consumption.

S7 runs the predecessor T4, T5, & T6 silicon software without modification to enable leveraging of the user's existing software investment.

S7's architecture is Chelsio's 7<sup>th</sup> generation DPU technology road-tested across several tier-1 OEMs over the years and has evolved to support all offloads using host memory. As a result, S7 technology can now enable a full featured DPU technology in a small memory-free package to address server and cloud applications at an aggressive price point.

### The Memory-free Operation

S7's architecture allows using the host memory for performing various offload functions, removing the need for card memories. The system can benefit from host CPU savings, with no additional cost compared to regular stateless offload NIC, resulting in an extremely lower cost bill of materials. Up to 2048 offload connections can be cached on S7 concurrently, making it an ideal choice for Client/Initiators. It uses the exact same firmware and software that runs on T7 (with card memory).

### Highlights

- Full suite of Storage features
- Full suite of Cloud features
- Full suite of data center networking features
- Full suite of data streaming features
- Full suite of encryption functions
- Embedded programmable DPU
- Integrated Ethernet switch
- Software Compatible with T4, T5, and T6

### Applications

#### Datacenter Networking

- Scale out servers and NAS systems
- Consolidate LAN, SAN, and cluster networks (run InfiniBand and FibreChannel applications on Ethernet)
- Enhanced network and server security

#### Cloud Computing

- Virtualization features to maximize cloud scaling and utilization
- Cloud-ready functional and management features
- Secure Sockets offload
- Full support for overlay products

#### Networked Storage

- Develop high-performance shared-storage systems providing both file and block level services
- Integrated encryption support
- NVMe Fabrics (iWARP & RoCEv2)
- NVMe/TCP
- Very high data-integrity

#### High Performance Computing

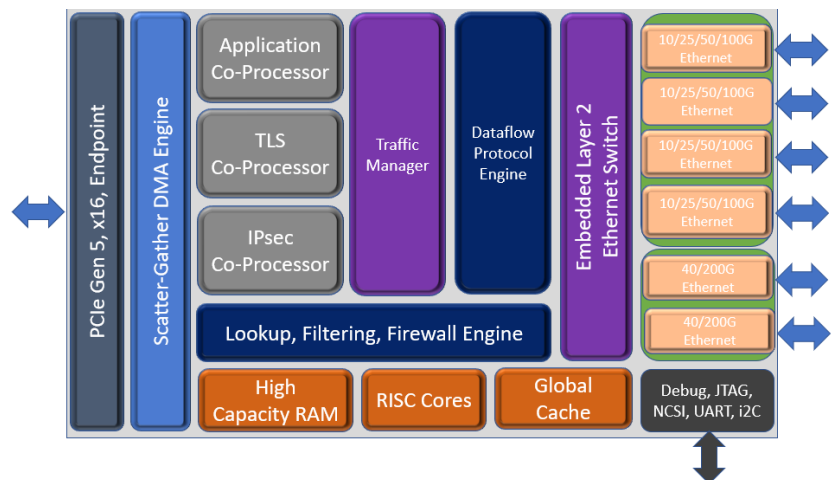
- Very low latency Ethernet
- High performance RDMA support
- Increase cluster fabric bandwidth

#### Streaming Applications

- Internet attack protection
- QoS and Traffic Management
- Video streaming

#### Edge Products

- Micro Servers
- Gateways
- 5G Appliances
- Firewalls



S7 Block Diagram

# Features

	S74	S72		S74	S72		S74	S72
<b>Host Interface</b>			<b>Storage</b>			<b>High Performance RDMA</b>		
PCI Express Gen5 x16	✓	✓	iSCSI initiator and target mode stack	✓	✓	Native RoCEv2 support	✓	✓
End Point (EP) operation	✓	✓	T10 DIF/DIX support for iSCSI	✓	✓	Native iWARP support	✓	✓
MSI-X, MSI, legacy pin interrupts	✓	✓	NVMe-oF Offload (iWARP)	✓	✓	All to All support	✓	✓
<b>Wire Interface</b>			<b>Security</b>			<b>TCP &amp; UDP Offload</b>		
NRZ or PAM4	✓	✓	NVMe-oF Offload (RoCEv2)	✓	✓	Full TCP stack including IPv4 & IPv6	✓	✓
2x1/10/25/40/50/100G	✓	✓	NVMe/TCP Offload	✓	✓	Extensive RFC compliance, fully featured	✓	✓
4x1/10/25/50/100G or 2x40/100/200G	✓	✓	iSER	✓	✓	VLAN support up to 4096 VLAN IDs	✓	✓
IEEE 802.3cd (50/100/200GbE)	✓	✓	Data-at-rest encryption	✓	✓	Load balancing and failover capabilities	✓	✓
IEEE 802.3bs 200GbE	✓	✓	<b>Cloud &amp; Virtualization</b>			UDP Sockets API	✓	✓
IEEE 802.3by 25GbE	✓	✓	AES 128/256 and SHA1/SHA2 offload	✓	✓	Low user-to-user latency	✓	✓
IEEE 802.3bm 40GbE/100GbE	✓	✓	TLS and IPsec co-processor mode	✓	✓	Multicast replication on ingress or egress	✓	✓
IEEE 802.3ba (40/100GbE)	✓	✓	TLS and IPsec inline mode	✓	✓	Patented Seamless Failover	✓	✓
IEEE 802.3bj (100 GbE over copper/backplane)	✓	✓	QUIC co-processor mode	✓	✓	Proxy Switching	✓	✓
IEEE 802.3az Energy Efficient Ethernet	✓	✓	QUIC inline mode	✓	✓	High capacity offload without card memory	✓	✓
IEEE 802.3ap Backplane Ethernet	✓	✓	Inline IPsec & TLS for all Offload Traffic	✓	✓	<b>Data Center Features</b>		
IEEE 802.3ae (10 GbE)	✓	✓	Secure firmware update	✓	✓	Internet Attack Protection	✓	✓
IEEE 802.3z (1GbE)	✓	✓	Hardware Root of Trust support	✓	✓	PFC, DCB, CEE	✓	✓
IEEE 802.1p Priority	✓	✓	<b>Stateless Offloads</b>			Time stamping support	✓	✓
IEEE 802.1Q VLAN Tagging	✓	✓	TCP/UDP checksum offload for IPv4 & IPv6	✓	✓	Flow mirroring, sampling and statistics	✓	✓
IEEE 802.1Qbg EVB/VEPA	✓	✓	TSO, LSO, and GSO for IPv4 & IPv6	✓	✓	GPU Direct	✓	✓
IEEE 802.1BR Bridge Port Extension	✓	✓	VLAN filtering, insertion & extraction	✓	✓	GPU Direct Storage (GDS)	✓	✓
IEEE 802.1Qau Congestion Notification	✓	✓	Packet filtering and attack protection	✓	✓	<b>Management and Other Interfaces</b>		
IEEE 802.1Qbb PFC	✓	✓	Nanosecond granularity 64b timestamping	✓	✓	UART	✓	✓
IEEE 802.1Qaz (ETS)	✓	✓	Ethernet Routing (packet header rewrite)	✓	✓	NC-SI	✓	✓
IEEE 802.3x Flow Control	✓	✓	Packet Tracing and Packet Sniffing	✓	✓	SPI Flash	✓	✓
IEEE 802.3ad Load-balancing and Failover	✓	✓	Adaptive interrupt coalescing	✓	✓	I2C, MDIO, GPIO, JTAG	✓	✓
Ethernet II and 802.3 encapsulated frames	✓	✓	Receive side scaling (RSS)	✓	✓	PLDM, MCTP (SMBus or PCIe), RBT	✓	✓
Multiple MAC addresses per interface	✓	✓	<b>Embedded Processors</b>			SGMII for 1Gb BMC interconnect	✓	✓
Jumbo Frames up to 9.6 Kbytes	✓	✓	400Gb DPU Core	✓	✓	JTAG IEEE 1149.1 and IEEE 1149.6	✓	✓
ITU-T G.8262, Sync-E	✓	✓				SyncE	✓	✓
IEEE 802.1AS Timing and Synchronization	✓	✓				<b>Boot Facilities</b>		
IEEE 1588 PTP	✓	✓				iSCSI, PXE, UEFI	✓	✓
<b>Streaming</b>						Secure Boot	✓	✓
Integrated Traffic Management	✓	✓						
Advanced QoS support	✓	✓						
Hierarchical QoS	✓	✓						

## Ordering Information

	S72ASIC	S74ASIC
Card Memory	No	
Conn. Capacity	Up to 500k	
Cached conns.	2k	
200Gb Typ Power*	8W	14W
200Gb WC Power*	15W	19W
Package Size (0.8mm pitch)	21mm	21mm

\* Configuration dependent

## Physical & Environmental

- Fully RoHS Compliant
- Operating Temp: -40° to 55° C or -40° to 131° F
- Operating Humidity: 5 to 95%

INFORMATION IN THIS DOCUMENT IS PROVIDED IN CONNECTION WITH CHELSIO PRODUCTS. NO LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS IS GRANTED BY THIS DOCUMENT. EXCEPT AS PROVIDED IN CHELSIO'S TERMS AND CONDITIONS OF SALE FOR SUCH PRODUCTS, CHELSIO ASSUMES NO LIABILITY WHATSOEVER, AND CHELSIO DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY, RELATING TO SALE AND OR USE OF CHELSIO PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. CHELSIO PRODUCTS ARE NOT INTENDED FOR USE IN MEDICAL, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS. CHELSIO MAY MAKE CHANGES TO SPECIFICATIONS AND PRODUCT DESCRIPTIONS AT ANY TIME WITHOUT NOTICE.

Copyright © 2024 - Chelsio Communications - All rights reserved.